

BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554

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In the Matter of )  
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Amendment of Parts 2 and 95 of  
the Commission's Rules to Create a  
Wireless Medical Telemetry Service

ET Docket No. 99-255

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COMMENTS OF  
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## SUMMARY

Final Analysis Communication Services, Inc., a licensee in the Non-Voice Non-Geostationary Mobile Satellite Service ("NVNG MSS"), agrees that different spectrum should be allocated to a new Wireless Medical Telemetry Service ("WMTS") to avoid interference to medical telemetry equipment operations. However, Final Analysis does not support either of the specific allocation options proposed by the Commission because they would result in excessive and inefficient spectrum allocations to WMTS and would harm the interests of NVNG MSS operators in the same frequencies. Instead, Final Analysis offers several other alternatives for suitable allocations to WMTS that would not harm the interests of NVNG MSS.

The NVNG MSS industry has long suffered the lack of sufficient spectrum. The amount of spectrum allocated for both service and feeder links for these global low earth orbit satellite systems is inadequate. Moreover, the particular frequencies that have been allocated to NVNG MSS are heavily utilized by other satellite and terrestrial operators, which significantly constrains the ability of licensees to deploy their systems to their fullest potential to serve the public interest. Over the past several years, the NVNG MSS industry and the U.S. government have worked very hard together to try to obtain additional global allocations to NVNG MSS at World Radio Conferences. To date, these efforts have largely failed because the bands selected to avoid interference problems in the United States are heavily occupied in other regions.

However, 6 MHz around 1.4 GHz have been identified as suitable for NVNG MSS (1390-1393 MHz for uplink feeder links and 1429-1432 MHz for downlink feeder links). The lengthy process of obtaining global allocations is on the threshold of success. A primary allocation of these exact same frequencies to WMTS in this proceeding would likely undo all of

the intensive efforts that have been made so far to secure these allocations. Most importantly, it is not necessary to do this to satisfy the needs of medical telemetry.

The approximately 6 MHz for current use and 12 MHz for future use estimated by the AHA as required for WMTS, has never been supported. These estimates in fact reflect unrealistic expectations regarding usage growth, do not reflect appropriate spectrum efficiency considerations, and inappropriately include expectations of unauthorized applications, such as voice and video. In light of the fact that even the initial 6 MHz requested by AHA has not been justified, the proposed allocation of 14 MHz to WMTS is wasteful and unwarranted.

As explained herein, Final Analysis supports the allocation to WMTS, on a primary basis, of 6MHz of spectrum in the 608-614 MHz bands, which are bands AHA has specifically requested. To the extent additional spectrum needs are justified, the Commission must look first to the 1385-1390 MHz and 1432-1435 MHz bands, which AHA also has specifically requested, and which Final Analysis agrees with AHA need not be allocated by auction.

To the extent that allocation of any different spectrum is justified, the Commission should allocate only those frequencies that do not overlap with the frequencies targeted for potential global allocation to NVNG MSS. Specifically, 6MHz in the 1394-1400 band and/or 2 MHz in the 1427-1429 MHz band can be allocated to WMTS without overlapping NVNG MSS.

The FCC's proposed Options 2 is not recommended because it is not known, at this time, whether NVNG MSS can share uplink feeder link spectrum with WMTS. The FCC's proposed Option 1 is not feasible because NVNG MSS systems, with a broad footprint, cannot assure WMTS of protection from interference downlink feeder link spectrum.

Final Analysis strongly urges the Commission to ensure efficient WMTS spectrum use by excluding voice and video transmissions from the definition of "medical telemetry," limiting

primary WMTS operations to uni-dimensional data transmissions, requiring that WMTS operations be limited to health care facilities, requiring WMTS equipment to meet spectrum efficiency technical standards and testing requirements, utilizing a frequency coordinator and licensing any WMTS operations that overlap NVNG MSS target frequencies.

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**COMMENTS OF  
FINAL ANALYSIS COMMUNICATION SERVICES, INC.**

Final Analysis Communication Services, Inc. ("Final Analysis"), by its attorneys, hereby comments on the FCC's *Notice of Proposed Rulemaking* in the above-captioned proceeding.<sup>1</sup> Final Analysis is a licensee in the Non-Voice Non-Geostationary Mobile Satellite Service ("NVNG MSS"),<sup>2</sup> and thus has a direct interest in this proceeding.

**I. INTRODUCTION**

The Commission proposes to allocate spectrum to a new Wireless Medical Telemetry Service ("WMTS"). This proposal has been made in light of the fact that current spectrum available to medical telemetry applications on an unlicensed or secondary basis is being used more intensively by other existing services and that implementation of digital television may cause spectrum crowding as well as direct interference to medical telemetry equipment.<sup>3</sup> The American Hospital Association ("AHA") has asked the Commission for an allocation of a total

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<sup>1</sup> Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service, Notice of Proposed Rulemaking, ET Docket No. 99-255, FCC 99-182 (rel. July 16, 1999) ("NPRM").

<sup>2</sup> Final Analysis Communication Services, Inc., Authorization for Non-Voice Non-Geostationary Mobile Satellite Service System, 13 FCC Rcd 6618 (1998).

<sup>3</sup> See NPRM at ¶ 11.

of 12 MHz of spectrum to accommodate existing and future demands for the use of medical telemetry equipment.<sup>4</sup> In response to that request, the Commission now has proposed the allocation to WMTS of a total of 14 MHz of spectrum, on a primary basis, including various frequencies around 1.4 GHz.

Final Analysis SUPPORTS the Commission's intent to ADDRESS the legitimate need on the part of the medical telemetry industry to obtain spectrum allocations that safeguards these important services from harmful interference. Final Analysis also appreciates the fact that the Commission, in this NPRM recognizes the significant work that the NVNG MSS industry, together with the FCC and other agencies of the U.S. government, have put in to obtaining international allocations for feeder link spectrum in the 1390-1393 MHz and 1429-1432 MHz bands, and that the Commission has attempted to fashion allocation options that would satisfy the needs of medical telemetry without having an adverse impact on NVNG MSS. However, as discussed in detail below, neither of the specific proposals advanced by the Commission serve these twin objectives. Each of the Commission's proposals would result in the excessive and inefficient allocation of spectrum to medical telemetry to the detriment of other services, including the NVNG MSS industry. This would not serve the public interest.

As discussed in detail below, neither of the specific proposals advanced by the Commission are appropriate or justifiable. Each would result in an excessive and inefficient allocation of spectrum to medical telemetry to the detriment of other services, including the NVNG MSS industry. This would not serve the public interest.

NVNG MSS constellations of low earth orbit ("LEO") satellites allow customers to use small, inexpensive, fixed or mobile user terminals to send and receive short data messages

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<sup>4</sup> See NPRM at ¶ 12.

anywhere in the world. The five licensed U.S. NVNG MSS companies lead the world in developing and implementing this important new technology which will bring innovative new services to consumers in the United States and around the globe and serve critical data communications needs worldwide. The low-cost global reach of NVNG MSS systems addresses many important service needs not served by other technologies. In addition to offering innovative and efficient data service options for a wide variety of commercial applications, NVNG MSS systems bring very cost effective data and messaging services to rural areas and developing countries, and assure reliable environmental monitoring and disaster communications in otherwise unreachable locations.

NVNG MSS does not yet have sufficient spectrum to deploy its systems effectively, and is far behind in obtaining the spectrum needed to meet anticipated demands for service capacity and availability. Final Analysis and the four other NVNG MSS licensees<sup>5</sup> have worked with the U.S. government for several years toward securing critically needed international allocations of additional spectrum. Historical experience with these efforts demonstrates that the achievement of international allocations is an extremely difficult, lengthy and resource intensive undertaking.

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<sup>5</sup> The other four licensees include Orbital Communication Corp. ("ORBCOMM"), Volunteers in Technical Assistance ("VITA"), Leo One Worldwide Inc. (formerly Leo One USA Corporation) ("Leo One"), and E-SAT, Inc. ("E-SAT"). See Application of Orbital Communications Corp., Order and Authorization, 9 FCC Rcd 6476 (1994) ("First Round ORBCOMM Order"); Application of Orbital Communications Corp., Order and Authorization, 13 FCC Rcd 10828 (1998) ("Second Round ORBCOMM Order"); Application of Volunteers in Technical Assistance, Inc., Order and Authorization, 11 FCC Rcd 1358 (1995) ("First Round VITA Order"); Application of Volunteers in Technical Assistance, Inc., Order and Authorization, 13 FCC Rcd 10845 (1998) ("Second Round VITA Order"); Application of Leo One USA Corporation, Order and Authorization, 13 FCC Rcd 2801 (1998); Application of E-SAT, Inc., Order and Authorization, 13 FCC Rcd 10859 (1998).



To be considered as a part of the U.S. proposal for allocation, at the 1995 World Radiocommunication Conference ("WRC-95"), the industry proposed allocation of ten bands for NVNG MSS but the United States only proposed four for allocation by the WRC. Prior to the 1997 World Radiocommunication Conference ("WRC-97"), the industry performed technical studies on seven bands and pursued several more. Only three were proposed by the United States. Despite the inherent ability of NVNG MSS systems to share spectrum with other services, on each occasion the NVNG MSS industry has encountered strong opposition in the international community because of the reluctance of incumbent users in targeted frequency bands to share spectrum, and because the United States has consistently proposed bands that have little opposition in the United States, but strong opposition internationally. Due to these limited proposals at WRC-95 and WRC-97, the U.S. was unsuccessful in obtaining any global allocation at either conference.<sup>6</sup>

At WRC-97, the United States and the NVNG MSS industry did obtain a resolution supporting technical studies for additional allocations for NVNG MSS, but actual allocations based upon these studies are not scheduled to be considered until WRC-2002. This historical experience by NVNG MSS with the difficulties in obtaining even small international allocations has demonstrated that essential ingredients to success include both the strong support of the U.S. government, a focus on proposed spectrum allocations in bands that have the same types of compatible incumbent systems on a world-wide basis, and a focus on bands that are not likely to engender international opposition.

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<sup>6</sup> Frequencies at 454-456 MHz and 459-460 MHz were allocated to Region 2 (North and South America) only although some other countries opted to agree to the allocation on a country-by-country basis. These bands are allocated for service uplinks, and no proposal for service downlinks has been adopted per either regional or global allocation at either WRC-95 or WRC-97. These bands have not been allocated to the industry domestically, and we urge the Commission to make these allocations as soon as possible.

Currently, the United States and the NVNG MSS industry's highest priority is to obtain international allocations at WRC-02 for NVNG MSS in the 1390-1393 MHz and 1429-1432 MHz frequency bands. These bands have the least of international opposition to an allocation to NVNG MSS, and represent the only chance for success in obtaining badly needed additional frequencies for NVNG MSS feeder links. Consequently, the efforts to obtain these allocations are now very close to succeeding.

However, the Commission's proposals in this proceeding, which include primary allocations to WMTS in some of the very same bands sought by the NVNG MSS parties for international allocation, would deal a serious blow to the efforts to obtain global feeder link spectrum for NVNG MSS. It would damage the credibility of U.S. advocacy efforts, erode international support and possibly doom to failure any further effort to obtain international allocations for NVNG MSS in these bands.

Final Analysis agrees with the Commission's tentative conclusion that spectrum should be allocated to WMTS to ensure that medical telemetry services are free from interference. However, the Commission must ensure that any new allocation of spectrum to WMTS is based on the following two essential principles:

1. The medical telemetry industry must be required to maximize spectral efficiency, particularly if it is to receive a primary allocation. As described herein, the medical telemetry industry has not provided any quantified or objectively verifiable support for its stated current or future spectrum requirements. There is absolutely no justification currently on the record for the allocation that the Commission proposes to make.

2. Any new WMTS allocation must not adversely affect the ability of the NVNG MSS industry to gain international allocations for feeder links in spectrum in particular bands

around 1.4 GHz, an effort that has been supported and promoted by the U.S. government through the ITU working parties. The Commission can, and must, find allocations for WMTS that do not impair the ability of NVNG MSS to obtain the international allocations it needs or that impose limitations on NVNG MSS which may constrain operations or increase the cost of this highly price-sensitive service.

Final Analysis and the NVNG MSS industry are more than willing to work with the medical telemetry industry to achieve a mutually agreeable solution to the spectrum needs of both groups. Since the NPRM was issued, Final Analysis and representatives of the other NVNG MSS licensees as well as representatives of the medical telemetry industry have had several discussions about the technical characteristics and requirements of their respective systems. Although no definitive conclusions have yet been reached as to the possibility that NVNG MSS and WMTS can share certain frequency bands around 1.4 GHz, Final Analysis and the NVNG MSS industry believe that the effort is worthwhile and will continue to engage in these discussions in good faith.<sup>7</sup>

Even in the absence of industry agreement on frequency sharing, however, Final Analysis believes that another suitable solution is at hand. Although neither of the Commission's proposals meet the principles outlined above, Final Analysis herein identifies several additional alternative approaches that would permit the Commission to satisfy the reasonable spectrum needs of medical telemetry without adversely affecting NVNG MSS.

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<sup>7</sup> Final Analysis must stress, however, that based on the limited information on technical characteristics, operational methods, and types of use provided to it by the Medical Telemetry Industry, it appears that sharing in the 1427-1432 MHz downlink band is not possible without causing harmful interference to WMTS.

## **II. THE NASCENT NVNG MSS INDUSTRY HAS A CRITICAL NEED FOR ADDITIONAL SPECTRUM**

### **A. Dedicated Feeder Links Are Essential To NVNG MSS Operations, and Currently Allocated Spectrum Is Insufficient.**

Communications to and from NVNG MSS satellites are made over both service and feeder links. Service links allow subscribers to communicate directly with orbiting satellites from low cost fixed or mobile terminals. Communications over these links are typically very short, "burst" type transmissions. Consequently, service links, currently allocated in the UHF and VHF bands, can be and are shared among the licensed NVNG MSS satellite systems as well as between NVNG MSS and terrestrial operations. Feeder links, on the other hand, carry customer data as well as spacecraft command and control signals. Feeder link transmissions require both continuous communication with the satellite, as well as sufficient dedicated spectrum in both the uplink and downlink directions to ensure proper operation of the constellation, and to achieve full system capacity.

From the time that NVNG MSS systems were first proposed, it has been clear that there is insufficient internationally allocated spectrum for the global operations of the NVNG MSS industry. The first international allocations occurred at the 1992 World Administrative Radio Conference ("WARC-92"), when NVNG MSS achieved co-primary allocations in the 137-138 MHz, 148-149.9 MHz, 149.9-150.05 MHz, and 400.15-401 MHz frequency bands. These bands are all heavily occupied by terrestrial commercial users and the downlink bands are heavily used by U.S. government and foreign satellite systems. Therefore, NVNG MSS allocations in the United States, made by the Commission in 1993, are on a co-primary shared basis.

The Commission has sought to promote the public interest in receiving low-cost NVNG MSS services through the authorization of a competitive industry consisting of five licensees.

However, although NVNG MSS systems utilize a relatively small amount of spectrum overall, particularly in comparison to voice or broadband data "Big LEO" systems, there is far from enough spectrum in the bands allocated internationally and in the U.S. to NVNG MSS to accommodate all of the licensees' current requirements. Largely for this reason, the process of licensing the current NVNG MSS systems and assigning specific frequencies to particular licensees has spanned nearly a decade, severely delaying the introduction of competition in the industry and forcing several license applicants to drop out. This process also has involved intensive efforts and has resulted in extraordinary measures to ensure efficient spectrum utilization, including careful coordination among systems, the development of innovative and technically complex frequency sharing techniques, and even reliance upon future international allocations for NVNG MSS. For example, to ensure that a minimally competitive market can be implemented within the very little spectrum available, the NVNG MSS licenses include such requirements as:

- System 1 (Leo One) must share all but 25 KHz of its currently assigned downlink frequencies with the national security sensitive Air Force Defense Meteorological Satellite System ("DMSP") by using time sharing<sup>8</sup> and/or frequency hopping techniques, and System 2 (Final Analysis) must time share downlink frequencies with the National Oceanic and Atmospheric Administration ("NOAA") meteorological system as well as with VITA.<sup>9</sup>
- System 2 (Final Analysis) was required to accept a deferred assignment for some of its required service downlink spectrum, receiving as part of its license a highly unusual right to first priority to apply for up to 210 KHz (plus

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<sup>8</sup> Time sharing is a technique never before relied upon by the U.S. government for sharing spectrum with non-geostationary satellite constellation. It requires that the commercial licensee either actually turn off satellite transmissions or hop to another frequency when any of its satellites' footprints overlap that of a government satellite operating on the same frequency anywhere in the world. While reliance on this technique has enabled the Commission to license multiple systems, it will place significant limitations on the operation of NVNG MSS systems, which result in both increased costs and service capacity and availability degradations compared with the capacity and availability that would be possible with dedicated non-shared service links.

<sup>9</sup> ORBCOMM does not have to timeshare its downlink service links because it is a first-round licensee and timesharing did not become necessary or applicable until the second round.

additional spectrum for Doppler requirements) of spectrum (for seven downlink channels) from frequencies that may be allocated internationally to NVNG MSS at the 1999 World Radio Conference ("WRC-99"), or subsequent World Radio Conferences ("WRCs").<sup>10</sup>

- System 3 (E-Sat) must operate in a spread-spectrum mode across the same downlink frequencies utilized by Systems 1 and 2.
- Three licensees (ORBCOMM, Leo One and Final Analysis) must share all service uplink frequencies using dynamic channel activity assignment ("DCAAS") techniques. E-Sat also must share a portion of these uplink frequencies using spread spectrum techniques.

These unusual frequency assignment solutions and exacting licensing conditions demonstrate that the Commission and the NVNG MSS industry have already gone to extraordinary lengths to ensure the highest possible spectrum efficiency for these systems. These extraordinary steps have been forced on the Commission and the industry because of the extremely limited, inadequate amount of spectrum available for NVNG MSS. The NVNG MSS industry and the Commission have continued to work closely together toward securing the future international allocations that are needed to fill out NVNG MSS spectrum requirements. This is particularly true with respect to efforts to obtain additional feeder link spectrum allocations, and must be kept in mind when considering allocation of spectrum to spectrally inefficient services.

The Commission has long acknowledged that each NVNG MSS system requires dedicated feeder link spectrum for both uplink and downlink communications.<sup>11</sup> Despite the critical need for dedicated feeder links, insufficient unencumbered spectrum is currently allocated to NVNG MSS feeder link operations. At present, each of the four larger NVNG MSS licensees has been assigned only 50 kHz for uplink feeder link spectrum in VHF spectrum bands.

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<sup>10</sup> Final Analysis Communication Services, Inc., Authorization for Non-Voice Non-Geostationary Mobile Satellite Service System, 13 FCC Rcd 6618, ¶¶ 68-71 (1998); *see also Amendment of Part 25 of the Commission's Rules to Establish Rules and Policies Pertaining to the Second Round of Non-Voice, Non-Geostationary Mobile Satellite Service*, Report and Order, 13 FCC Rcd 9111, ¶ 36 (1997) ("Second Processing Round Order").

<sup>11</sup> *See, e.g., Second Round Processing Order* at ¶ 48.

This spectrum is heavily utilized by other incumbent users and is not very suitable for feeder link operations on a global basis due to coordination constraints imposed by other foreign satellite systems. Additionally, the need to utilize VHF frequencies for feeder links limits the availability of that spectrum for much needed service links. Most importantly, none of the NVNG MSS second round licensees has been assigned any dedicated downlink feeder link spectrum.

In recognition of the severe shortage of feeder link spectrum, the current frequency assignments for NVNG MSS feeder links are subject to a possible “daisy chain” of reassignment in the event that additional international NVNG MSS allocations become available. Specifically, in the event future allocations for feeder links become available, Final Analysis must accept a new feeder link assignment and vacate its currently assigned feeder uplink frequencies in favor of ORBCOMM.<sup>12</sup> The feeder link spectrum currently assigned to ORBCOMM will then become available for uplink service links shared by ORBCOMM, Leo One and Final Analysis.

There will be no “daisy chain” reassignment to relieve pressure on service and feeder link frequencies unless and until more spectrum is allocated domestically and internationally for NVNG MSS. However, even the eventual implementation of this daisy chain will not alleviate the essential problems with NVNG MSS feeder links. Sufficient allocations in suitable frequencies must still be found to support the required dedicated service and feeder link spectrum. A total of an additional 6 MHz of feeder link spectrum – 3 MHz for feeder uplinks and 3 MHz for feeder downlinks –has been identified as the minimum amount required by the NVNG MSS industry to meet its current needs.

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<sup>12</sup> See, e.g., *id.* at ¶ 42.

**B. The United States and the NVNG MSS Industry Have Been Working Together to Secure Additional Spectrum for Dedicated Feeder Links on a Global Basis.**

The United States has sought to obtain additional global allocations for NVNG MSS at the past two World Radiocommunication Conferences. In 1996, the Commission staff suggested to the NVNG MSS industry that frequency bands around 1.4 GHz be studied for possible international allocation for NVNG MSS feeder links.<sup>13</sup>

Recognizing the critical need for the allocation of more feeder link spectrum to NVNG MSS on a global basis, the United States introduced sharing studies into ITU-R Working Party 8D in 1996 on NVNG MSS feeder links in the 1.4 GHz bands,<sup>14</sup> but there was insufficient time for technical review to allow the consideration of allocations at the 1997 World Radiocommunication Conference ("WRC-97"). Consequently, the United States proposed that the WRC-97 initiate technical sharing studies of the use of 1390-1400 MHz for NVNG MSS feeder uplinks and 1427-1432 MHz for NVNG MSS feeder downlinks, and Resolution 127 to this effect was approved.<sup>15</sup>

The United States selected these particular frequency bands around 1.4 GHz for several reasons. These bands are technically suitable for feeder link operations. Allocation of spectrum in the L band would also remove the necessity of locating feeder links in the crowded UHF/VHF bands, which are more suitable for NVNG MSS service operations. Moreover, these bands contain the same allocations, fixed and mobile, in all regions throughout the world and thus are

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<sup>13</sup> At the 1995 World Radiocommunication Conference ("WRC 95"), the United States proposed Resolution 214 for additional studies of global allocations to NVNG MSS. *See* Final Acts of the World Radiocommunication Conference, Geneva 1995 (adopting Resolution 214).

<sup>14</sup> *See* ITU-R Doc. 8-D/142-D, 18 Oct. 1996.

<sup>15</sup> *See* United States Proposals for the 1997 World Radiocommunication Conference, October 1997, Document No. USADD.R01, October 17, 1997 Version, page 6.



particularly suitable for global allocations.<sup>16</sup> In the United States, although these frequencies around 1.4 GHz were designated to be reallocated from government to non-government use,<sup>17</sup> they have been placed on reserve and have not yet been made available to any non-government systems.<sup>18</sup> Consequently, unlike other frequencies that might be considered for international allocation, they are not yet occupied by terrestrial or other commercial services with systems incompatible with NVNG MSS.<sup>19</sup> Most importantly, these frequencies also are not heavily occupied in other countries and regions by other services that are highly sensitive to potential interference. Thus, these frequencies are least likely to encounter international opposition to an NVNG MSS allocation and indeed have progressed significantly towards allocation. Given the historical opposition to additional international allocations of spectrum to the NVNG MSS industry, this is an important consideration.

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<sup>16</sup> Also, these types of terrestrial uses can most easily share with NVNG MSS systems for uplink and downlink operations.

<sup>17</sup> See Omnibus Budget Reconciliation Act of 1993 ("OBRA 93").

<sup>18</sup> According to the Commission's 1996 Plan for Reallocated Spectrum, this spectrum was not to be subject to allocation until 2006. See Plan for Reallocated Spectrum, 11 FCC Rcd 17841, ¶ 4 (1996).

<sup>19</sup> Also, NVNG MSS downlink feeder links operating at 1429-1432 MHz would be sufficiently offset from the radio astronomy service that the stringent requirements for coordination with radio astronomy could be met.

Since 1996, significant work on sharing studies has been conducted in various ITU Working Groups. The United States, along with the NVNG MSS industry, also has continued to work to garner international support for global allocation of frequency around 1.4 GHz for NVNG MSS feeder links, and significant work has been done in preparation for WRC-2000.<sup>20</sup>

The NVNG MSS industry is completing the technical studies and hardware demonstrations that indicate the ability to use these bands without harmful interference to in-band or adjacent users. Radio Astronomy insisted on demonstrations well beyond what is normally relied upon as a definitive sharing analysis. Accordingly, Final Analysis conducted hardware testing at its own facility. Then, although theoretical studies are typically sufficient for the ITU, the NVNG MSS industry hired an independent laboratory (Texas A&M) to perform additional hardware demonstrations to confirm these technical and hardware conclusions. Texas A&M issued a report confirming these studies and demonstrations. Finally, in addition to these equipment verifications, tests of actual flight hardware on Final Analysis's experimental satellite, FAISAT-2v, were done and confirmed these technical and laboratory findings.

ITU-R technical committees support the position of the United States that the 1390-1393 MHz and 1429-1432 MHz frequency bands should be allocated to NVNG MSS on a global basis for feeder links. The United States presented technical papers supporting the feasibility of using these bands for NVNG MSS feeder links to ITU-R Working Parties 7C & D, and 8D in Geneva

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<sup>20</sup> Specifically, IWG-2 approved a proposal to modify the agenda of WRC 2002 to consider allocation of the 1390-1393 MHz and 1429-1432 MHz frequency bands on a global basis to NVNG MSS for feeder links. IWG-10 approved and submitted the IWG-2 proposal to the Commission's WRC Advisory Committee ("WAC"). In turn, the WAC issued preliminary views that the WRC 2002 should allocate the 1390-1393 MHz and 1429-1432 MHz bands to NVNG MSS for uplink feeder links and downlink feeder links, respectively. The Inter-American Telecommunication Commission of the Organization of American States ("CITEL") has also approved a proposal of the United States to continue studies and consider global allocation of the 1390-1393 MHz and 1429-1432 MHz frequency bands to NVNG MSS at WRC-02/03.

earlier this year. The ITU-R WP 8D approved these studies.<sup>21</sup> ITU-R WP 7C proposed a work plan to draft recommendations for use of 1390-1393 for NVNG MSS feeder uplinks. Although the ITU-R WP 7D approved shared use of these bands by NVNG MSS in principle, it proposed that additional hardware demonstrations of the feasibility of using 1427-1432 for NVNG MSS feeder downlinks be completed before allocation decisions were actually made.

The industry efforts and United States government actions in support of global allocation of the 1390-1393 MHz and 1429-1432 MHz frequency bands to NVNG MSS for feeder links are the latest steps in a long and difficult process, which is still continuing, to secure additional spectrum for NVNG MSS.<sup>22</sup> The actions taken in this proceeding should not undercut the years of hard work that the United States, the Commission, and the NVNG MSS industry have invested in securing a global allocation in these bands for critically needed NVNG MSS feeder link operations. A primary allocation to WMTS of the exact same frequencies that the U.S. government and industry have strongly promoted for international allocation to NVNG MSS would severely undermine the credibility of that effort and make it difficult, if not impossible, to retain international support for these important NVNG MSS feeder link allocations. Given that it is the United States that has promoted these bands for NVNG MSS feeder links, the international community would very reasonably conclude that a United States proposal to allocate these bands on a primary basis domestically to another service with a questionable ability to share with

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<sup>21</sup> See WRC-97 Document USWP 8D-1 (April 1, 1999).

<sup>22</sup> See Report of the Below 1 GHz LEO Negotiated Rulemaking Committee, CC Docket 92-76 (September 16, 1992).

NVNG MSS feeder links would indicate that the United States no longer supports international allocation of these bands for NVNG MSS feeder links.<sup>23</sup> Due to the intensive complexity of finding spectrum suitable for global allocations, and the long lead times needed to perform technical studies for such allocations, any domestic WMTS allocation that chills domestic and international support for a global allocation in the same bands around 1.4 GHz for NVNG MSS feeder links may preclude additional global allocations for NVNG MSS services. In this light, it is essential that every effort be made to avoid any unnecessary overlap between new allocations for WMTS and the proposed bands for global allocations for NVNG MSS feeder links at 1390-1393 MHz and 1429-1432 MHz.<sup>24</sup>

### **III. AHA HAS NOT JUSTIFIED ITS REQUEST FOR AN ALLOCATION OF 12 MHz FOR WMTS ON A PRIMARY BASIS**

In its report to the Commission, AHA estimates that approximately 6.125 MHz is required to meet current patient needs, and that at least 12 MHz of spectrum is required, in the long term, to meet future patient needs.<sup>25</sup> AHA also has asked that a new allocation for medical telemetry be made on a primary basis.<sup>26</sup> However, AHA has based its request solely upon

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<sup>23</sup> Indeed, such a precedent could cause significant harm to the entire U.S. telecommunications industry internationally. If the United States indeed takes or adopts a position domestically that is contrary to a position it has strongly advocated internationally as is at risk here, other countries which participate in the ITU and WRC are likely in the future to discount the sincerity of any U.S. proposal -- for any radio service -- offered in these international forums.

<sup>24</sup> NVNG MSS has the most significant claim to these spectrum bands. The Land Mobile Communications Council ("LMCC"), which identified these bands for potential allocation in a petition for rulemaking, has stated on record that the 1390-1400 MHz and 1427-1432 MHz bands are not ideal for allocation to Private Land Mobile Services ("PLMS"). LMCC Petition at ¶¶ 74-78. Consequently, the Commission should consider other spectrum bands LMCC identified in its petition for allocation to PLMS, and reserve the 1390-1393 MHz and 1429-1432 MHz spectrum bands for allocation to NVNG MSS.

<sup>25</sup> See NPRM at ¶ 12.

<sup>26</sup> AHA actually asked for a primary and exclusive allocation. Final Analysis agrees with the Commission that an exclusive allocation cannot be justified for such a localized and low power service.

estimates derived from anecdotal information gleaned from an informal internal survey of 14 self-interested hospitals. The survey was inherently biased toward the inflation of estimated medical telemetry requirements.<sup>27</sup> AHA has completely failed to provide any technical justification or other independently verifiable support for its stated spectrum requirements. Using these questionable methods, it nonetheless came up with only 6.125 MHz as its estimated current needs. It then really doubled that figure to derive a future growth "estimate." The Commission the proposed to add two more spectrums, at the expense of an industry with pressing spectrum needs. The Commission's proposed allocation, on a primary basis, of more spectrum than actually has been requested, needed, or justified is certainly unwarranted.

Specifically, AHA has not undertaken any objective measurement of actual current medical telemetry usage. It has performed no independent market study of medical telemetry applications and demand. It has provided no technical description or empirical analysis of the spectral efficiency of current medical telemetry operations. In short, the AHA has not provided the most basic information that the Commission should require for independent verification of the spectrum demands the AHA has made for either current or future use.

The information available to scrutinize AHA's estimates of its current spectrum requirements is completely inadequate. For example, AHA based its estimated frequency requirements on the spectral efficiency metric of 0.8 bits per second per Hertz recommended by the FCC's rules in Part 90. It is not possible from the information on the record in this

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<sup>27</sup> AHA's survey asked the hospitals for: (1) a wish list of patient parameters that they would, if possible, monitor using medical telemetry equipment; (2) the projected number of patient-days each year that these parameters would be monitored; (3) a description of peak usage periods during a typical year and the percentage increase of patient volume for these peaks; (4) and projected growth rates for the next 5, 10, and 15 years. *See* Professional Group Questionnaire; Hospital Questionnaire. Given the longstanding use of these devices in hospitals and the patient records that hospitals must keep, an accurate calculation of the actual use of WMTS could have been accomplished and placed on the public record in this proceeding.

proceeding for the Commission or any third party to determine whether this assumption is appropriate.<sup>28</sup> AHA should be required to provide information about how medical telemetry equipment will utilize the additional spectrum requested, including whether WMTS can reuse frequencies within a single floor or on successive or alternative floors of a health care facility, whether WMTS can utilize different frequencies on a bed-by-bed basis, and/or whether WMTS can use CDMA, FDMA or TDMA to maximize spectral efficiency. AHA also should be required to submit a link budget to allow the Commission to determine how much link margin has been allocated for interference.<sup>29</sup> Additionally, if WMTS will share spectrum with other users, the industry should demonstrate the extent to which increased power levels can reduce the vulnerability of medical telemetry equipment to interference.

Just as the AHA has failed to justify current spectrum requirements, it has failed to support its assumption that medical telemetry spectrum needs may double over the next ten years. AHA has cited a few qualitative factors that it speculates indicate a general trend toward future growth. These include rising patient acuity, the increased practice of locating patients in nursing units remote from hard-wired monitoring wards, growing needs for data acquisition from monitoring devices, and the need to accommodate increasing monitoring needs outside of traditional hospital settings. However, AHA fails to cite significant countervailing factors that might tend to decrease medical telemetry needs. Such factors include a decrease in the length of

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<sup>28</sup> There are certain techniques that are designed to improve spectral efficiency which could conceivably be employed by WMTS. For example, the AHA has not indicated that they have considered the use of advanced modulation techniques, which could improve the spectral efficiency of WMTS. However, insufficient information has been provided in this proceeding to enable more specific suggestions to be made.

<sup>29</sup> Final Analysis has been requesting a link budget from the medical telemetry industry since July. However, the industry has so far affirmatively declined to provide any link budgets on the basis that such information is "proprietary."

acute care hospital stays, a decline in in-patient populations, and market pressure for the consolidation of over-built facilities or medical facilities due to reduced Medicare reimbursements for capital construction, increasingly stringent state Certificate of Need procedures required for new construction, and increasing hospital mergers. Further, as the NPRM suggests, improvements in technology over the next ten years could reduce the amount of spectrum needed for medical telemetry devices.

Moreover, the AHA itself acknowledges that it is difficult to predict the future volume of use of medical telemetry equipment in the absence of knowledge of future monitoring technology.<sup>30</sup> Thus, AHA's estimates are pure speculation. The medical telemetry industry should not be allowed to leverage a legitimate need for adequate spectrum that is less subject to interference into an unsupported and speculative demand for far more spectrum in order to satisfy a wish list for future operations that are much more expansive than current medical telemetry operations (*i.e.*, voice, video, in-home and mobile operations), particularly when the Commission has determined that such an expansion is not appropriate and when competing interests may be adversely affected.<sup>31</sup> The allocation of excessive spectrum to WMTS for needs that have not been identified or justified does not serve the public interest.

Given the critical spectrum needs of the NVNG MSS industry, which actually have been exhaustively studied and confirmed, the Commission's proposed primary allocation to WMTS is overly generous and cannot be justified. Therefore, it would be unfair and unreasonable for the Commission to allocate 14 MHz for medical telemetry service on a primary basis at this time.

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<sup>30</sup> Taskforce on Medical Telemetry, Final Report to the American Hospital Association, at Section 5 (December 17, 1998).

<sup>31</sup> In addition, AHA's estimate of future spectrum needs seems to have been based on this wish list of expanded types of operations (voice, video, mobile) and is also inflated for this reason.

The Commission should allocate now only that spectrum that can be independently verified as required to meet actual current medical telemetry needs. Once efficient new WMTS equipment is developed and the AHA has demonstrated on the record a genuine need for additional spectrum, the Commission can allocate more spectrum for WMTS.

Final Analysis does not dispute the Commission's tentative conclusion that, given the importance of medical telemetry operations, it is necessary to find better spectrum for WMTS in which it can have a primary allocation.<sup>32</sup> However, the Commission should not allow itself to be beguiled into approving an allocation that is far broader than actually warranted. The Commission has separately recognized the difficulties in ensuring spectrum efficiency in services characterized by "spectrum sharing and no-cost spectrum use."<sup>33</sup> Medical telemetry shares those characteristics. The Medical Telemetry industry has never been held to a standard of spectrum efficiency. The Commission should not allow the industry to transfer existing inefficiencies to newly allocated frequency bands which may be critically needed by other services. Therefore, before the Commission allocates new spectrum for WMTS, the medical telemetry industry should be required to demonstrate that they have taken all possible steps to minimize their own current as well as future spectrum requirements, that the amount of spectrum requested is based on spectrally efficient design, and that the requested amount of spectrum has been independently and reliably verified as necessary for WMTS operations.

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<sup>32</sup> See NPRM at ¶ 11.

<sup>33</sup> Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them, 10 FCC Rcd 10076, ¶ 2 (1995).



#### **IV. THE COMMISSION SHOULD CONSIDER ALTERNATIVES FOR SATISFYING THE NEEDS OF WMTS WITHOUT HARMING NVNG MSS**

##### **A. The FCC Should Allocate the 608-614 MHz Spectrum Band to Medical Telemetry Services On a Co-Primary Basis With Radio Astronomy.**

Final Analysis supports the Commission's proposal to allocate the 608-614 MHz frequency band to the medical telemetry services.<sup>34</sup> AHA has specifically requested allocation of this band. The band clearly offers a desirable solution for WMTS because it is currently authorized for medical telemetry and multiple component vendors are already available. The band is used by radio astronomy. However, based on current uses, it appears that co-primary operations are possible, and that WMTS operations can be conducted in ways that do not cause interference to radio astronomy operations.<sup>35</sup> Otherwise, the band is relatively unoccupied. Allocation of this spectrum to WMTS satisfies the 6 MHz current spectrum requirement for medical telemetry operations without causing adverse impact on any other service, including NVNG MSS.

Final Analysis urges the Commission not to allocate any additional spectrum to WMTS at the present time beyond the 6 MHz available in this band (and possibly some amount of radio astronomy relief spectrum) unless and until the medical telemetry industry makes the demonstration discussed above of actual need for additional spectrum.

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<sup>34</sup> See NPRM at ¶¶ 15, 20.

<sup>35</sup> In a small number of cases, existing health care facilities are located close to radio astronomy facilities. In these limited situations, medical telemetry operations on certain frequencies near existing radio astronomy facilities may need to be avoided in order to ensure that no harmful interference will be caused. For this reason, some additional spectrum in a different band may be necessary, even though the AHA estimation of current spectrum needs is not justified.

**B. In the Event Additional Spectrum is Justified, the FCC Should Allocate Frequencies in the 1385-1390 MHz and 1432-1435 MHz Spectrum Bands to WMTS On a Primary Basis.**

**1. Frequencies in the 1385-1390 MHz and 1432-1435 MHz Bands May Be Allocated to WMTS Without Auction**

In addition to the 6 MHz of spectrum in the 608-614 MHz band, AHA originally requested that medical telemetry be allocated 8 MHz of spectrum in the 1385-1390 MHz and 1432-1435 MHz bands.<sup>36</sup> AHA states that these particular frequency bands it has requested are the most suitable for medical telemetry based on the industry's analysis of equipment costs, data reliability, amount of spectrum in each band, and equipment power consumption.<sup>37</sup>

NTIA, however, has taken the position that the Balanced Budget Act of 1997 requires that these bands be made available through competitive bidding and that Federal agencies required to relocate from these bands are entitled to mandatory reimbursement for their relocation costs.<sup>38</sup> The Commission has sought to expedite this proceeding by looking for alternate spectrum and thus avoiding the auction issue.<sup>39</sup> However, failure to address NTIA's position will not necessarily avoid delay.

Especially because portions of the alternative spectrum identified by the Commission are critically needed by other services, including NVNG MSS, the Commission must examine whether the Balanced Budget Act in fact requires that the bands originally requested by AHA be made available through competitive bidding. If not, then it would be far more straightforward

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<sup>36</sup> See NPRM. at ¶ 13.

<sup>37</sup> See *id.*

<sup>38</sup> See *id.* at ¶ 16.

<sup>39</sup> See *id.* at ¶ 21.

and efficient, and would better serve the public interest, to allocate to WMTS the spectrum it had originally requested. Final Analysis agrees with AHA that that is the case, and that an auction is not required.

The Balanced Budget Act requires the Commission to “complete all actions necessary to permit the assignment by September 30, 2002, *by competitive bidding pursuant to section 309(j) of the Communications Act of 1934 (47 U.S.C. 309(j))*, of licenses for the use” of these frequency bands.<sup>40</sup> Section 309(j), however, exempts “public safety radio services” from competitive bidding. Specifically, Section 309(j)(2)(A), as it was amended in the very same Balanced Budget Act, provides that:

The *competitive bidding authority* granted by this subsection *shall not apply* to licenses or construction permits issued by the Commission . . . (A) for *public safety radio services*, including private internal radio services used by State and local governments and non-government entities . . . , that – (i) are used to protect the safety of life, health, or property; and (ii) are not made commercially available to the public . . . .<sup>41</sup>

As the AHA has pointed out, the fact that medical telemetry services are “public safety radio services” cannot seriously be contested.<sup>42</sup> Thus, licenses for medical telemetry services fall within Section 309(j)’s public safety exemption from auctions.

Medical telemetry services are not precluded from receiving this spectrum on the basis that they are exempt from competitive bidding as a public safety radio service.<sup>43</sup> In fact, in the very same statute mandating the reallocation of spectrum pursuant to the competitive bidding

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<sup>40</sup> Pub. L. No. 105-33, § 3002(c)(1), 111 Stat. 261 (1997) (amending Section 309(j) of the Communications Act of 1934) (emphasis added).

<sup>41</sup> 47 U.S.C. § 309(j) (emphasis added).

<sup>42</sup> See Report of the American Hospital Association Task Force on Medical Telemetry at 14-15.

<sup>43</sup> See *id.* at 16.

provisions of the Communications Act, Congress explicitly requires the Commission to “consider the needs of existing public safety radio services (as such services are described in Section 309(j)(2)(A) of the Communications Act of 1934, as amended by this [Balanced Budget] Act [of 1997])”<sup>44</sup> in making these frequency bands available for allocation. Acceptance of NTIA’s argument that allocation by auction is mandatory for these bands essentially would require the Commission to conclude that the public service exemption included within Section 309(j) is repealed specifically for frequencies at 1385-1390 MHz and 1432-1435 MHz. However, the Balanced Budget Act of 1997 contains no express language repealing the public service exemption in Section 309(j) for the frequencies at 1385-1390 MHz and 1432-1435 MHz, and it is well-settled in the law that statutory provisions should not be read to be repealed by implication.<sup>45</sup> Especially because the provisions for assignment of the subject frequencies in accordance with Section 309(j) and the amendments to Section 309(j) clarifying the public safety exemption from auctions are included in the exact same legislation, it would completely ignore the plain meaning of the legislation to assume that Congress intended that the spectrum in the 1385-1390 MHz and 1432-1435 MHz bands be subject to allocation by special auction rules that do not give effect to the public safety exemption. Congress could have, but did not, expressly state that the subject frequencies could not be allocated in any manner other than auction. Without such an expressly stated special allocation rule, it must be concluded that the full provisions of Section 309(j) apply, including the exemption from auction procedures for public safety services. Therefore, the Commission must be able to allocate the 1385-1390 MHz and

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<sup>44</sup> Pub. L. No. 105-33, § 3002(c)(2), 111 Stat. 261 (1997).

<sup>45</sup> See *Hill v. Tennessee Valley Authority*, 549 F.2d 1064, 1072-73 (6<sup>th</sup> Cir. 1977) (“repeal [of a statutory provision] by implication is disfavored”).

1432-1435 MHz spectrum bands for medical telemetry service as AHA requests without conducting an auction.

NTIA also is mistaken in its assertion that Federal agencies required to relocate from these bands are entitled to mandatory reimbursement for their relocation costs under the Strom Thurmond National Defense Authorization Act of 1998, which amended Section 113(g)(1) of the NTIA Organization Act.<sup>46</sup> That section provides, in relevant part:

In order to expedite the *commercial use* of electromagnetic spectrum . . . , any Federal entity which operates a Federal Government station may accept from any person payment of the expense of relocating . . . . Any such Federal entity which proposes to so relocate shall notify the Commission, *before the auction* concerned of the marginal costs anticipated to be associated with such relocation . . . .<sup>47</sup>

Accordingly, when a Federal agency is required to relocate to “expedite the commercial use” of spectrum, the holder of the license granted through competitive bidding for the commercial use must reimburse the agency for its relocation costs. However, an allocation to WMTS, which is an exempt public safety use, is not the same as an allocation made to “expedite a commercial use” which is subject to auction procedures, and thus any Federal agency that may have to relocate to accommodate WMTS is not entitled to mandatory compensation for relocation costs. Therefore, the Commission can allocate the 1385-1390 MHz and 1432-1435 MHz spectrum bands to WMTS as AHA requests without requiring licensees to recompense the relocation costs of any Federal agency that might have to relocate.

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<sup>46</sup> 47 U.S.C. § 923(g)(1).

<sup>47</sup> *Id.* (emphasis added).

NTIA's concern about potential interference to medical telemetry services operating in the 1385-1390 MHz spectrum band caused by high power government radars operating below 1385 MHz would only be a factor in areas near those radar locations.<sup>48</sup> However, in those areas in which high power government radars may cause potential interference to medical telemetry services operating in the 1385-1390 MHz spectrum band, the medical telemetry equipment could be operated in the 608-614 MHz or the 1432-1435 MHz spectrum band instead.<sup>49</sup>

Because the frequency bands originally requested by medical telemetry can be allocated without competitive bidding or relocation reimbursement, to the extent that any additional allocation for WMTS beyond the frequencies in the 608-614 MHz band is justified, there is no rational basis to consider other frequency bands for allocation instead of the 1385-1390 MHz and 1432-1435 MHz bands.

**2. The Commission May Not Remove Spectrum From Reserve Unless And Until A Determination Has Been Made That It Can Be Replenished**

As demonstrated herein, the alternate frequencies identified by the Commission, *i.e.*, frequencies at 1390-1400 MHz and 1427-1432 MHz, is spectrum in which other parties, including NVNG MSS licensees, have important interests. Additionally, this is reserve spectrum which was not supposed to be made available for allocation until 2006.<sup>50</sup> The Commission has stated in the NPRM that it will take up the issue of the replenishment of reserve spectrum in a

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<sup>48</sup> See NPRM at ¶16.

<sup>49</sup> This same rationale applies to the 1390-1400 MHz and 1427-1432 MHz spectrum bands, and will not be repeated for the sake of brevity.

<sup>50</sup> Section 6001(a)(3) of OBRA 93 required the Commission to hold a significant portion of spectrum transferred from the government in reserve. The 1390-1400 MHz and 1427-1432 MHz bands were identified as part of the reserve by the *FCC Plan for Reallocated Spectrum*, 11 FCC Rcd 17841, ¶ 4 (1996).

separate proceeding.<sup>51</sup> However, the Commission has not pointed to any source of authority that permits it to remove spectrum from reserve for early allocation in the absence of a simultaneous determination that it feasibly can be replenished. Especially when the need for the allocation has not been adequately demonstrated, such an action is arbitrary and capricious. Even if the need for current allocation of the spectrum can be justified, fairness and due process are certainly compromised if spectrum is summarily removed from reserve without a concurrent determination that it can be replenished.

**C. Alternatively, the FCC Should Allocate Frequencies in the 1394-1400 MHz Spectrum Band to WMTS if Additional Spectrum Is Justified.**

The Commission should consider allocation to WMTS of other spectrum than what AHA has requested only in the event that additional spectrum for WMTS beyond the 6 MHz allocated in the 608-614 MHz band is justified, the Commission makes an express determination that the 1385-1390 MHz and 1432-1435 MHz spectrum bands may not be allocated to WMTS other than by auction, and the Commission finds authority for the removal of spectrum from reserve in the absence of replacement frequencies. Under such circumstances, the Commission should allocate to WMTS only those additional frequencies around 1.4 GHz that do not overlap the frequencies that are being studied for NVNG MSS feeder links.<sup>52</sup>

In particular, the FCC can more than adequately satisfy the needs of medical telemetry, without harming the needs of NVNG MSS, by allocating to WMTS up to an additional 6 MHz

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<sup>51</sup> See NPRM at ¶ 17, n.28.

<sup>52</sup> In the event that the Commission determines that the justified spectrum needs of WMTS cannot be fully met in the 608-614 MHz band (e.g., for radio astronomy relief), and the Commission further decides that, notwithstanding the clear language of the statute, there are no circumstances under which the spectrum in the 1385-1390 MHz and 1432-1435 MHz bands may be allocated except pursuant to auction, then some portion of the spectrum in the 1393-1400 MHz bands could be allocated to enable WMTS to operate in the 608-614 MHz band and still have an alternative frequency for operations near radio astronomy sites.

between 1394-1400 MHz. This would provide WMTS with the total of up to 12 MHz that AHA has estimated is required for its long term needs without causing any overlap with spectrum identified as a potential international allocation for NVNG MSS feeder links.<sup>53</sup>

**D. The FCC May Also Allocate Frequencies in the 1427-1429 MHz Spectrum Band to WMTS if Additional Spectrum Is Justified.**

In the event that the same conditions as mentioned above have been met, but that the medical telemetry industry has justified either the need for more than 12 MHz of spectrum or for different spectrum (*e.g.*, for radio astronomy relief or for sufficient separation for permissible bi-directional operations), the Commission should consider the additional allocation to WMTS of 2 MHz of spectrum between 1427 –1429 MHz.<sup>54</sup> This would provide medical telemetry services with a total of 14 MHz, which exceeds the request of the AHA for additional spectrum by 2 MHz. Most importantly, this option, unlike the FCC's proposed options, would leave the 1390-1393 MHz and 1429-1432 MHz bands free for allocation to NVNG MSS for feeder links.

**E. FCC Option 2 Is Not Recommended Because It Unnecessarily Requires WMTS and NVNG MSS to Share Spectrum.**

In the NPRM, the Commission proposed to allocate the 1391-1400 MHz band to WMTS as "Option 2."<sup>55</sup> Although this option would not require the sharing of NVNG MSS dedicated

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<sup>53</sup> In the event that the Commission finds that AHA has justified a need for 7 MHz of spectrum beyond the 6 available in the 608-614 MHz band, the Commission could allocate the 1393-1400 MHz band to WMTS.

<sup>54</sup> Final Analysis and other members of the NVNG MSS industry have discussed this allocation option (1394-1400 MHz and 1427-1429 MHz) with the medical telemetry industry. Although the medical telemetry industry views this option favorably, they have observed that an unlicensed incumbent currently operates on 1427-1429 MHz. Final Analysis believes that any preexisting unlicensed secondary use in this band should not be a bar to a primary allocation to WMTS.

<sup>55</sup> See NPRM at ¶ 23.



feeder downlink frequencies with medical telemetry services, it would require the sharing of NVNG MSS feeder uplink frequencies with medical telemetry services. NVNG MSS dedicated feeder uplinks may cause harmful interference to medical telemetry services operating in overlapping bands.

To date, Final Analysis and the NVNG MSS industry have had only preliminary exchanges of technical sharing information with the AHA and the medical telemetry industry. Without access to significantly more information on the characteristics and operational employment of WMTS equipment, Final Analysis cannot make any definitive judgment on the prospects for coordination with WMTS in this band. At this time, Final Analysis believes that geographic separation between remote NVNG MSS ground stations and authorized health care facilities may not be sufficient to prevent interference between NVNG MSS uplink feeder operations and medical telemetry operations in the 1390-1393 MHz spectrum band. Satellite tracking to elevations as low as 5 degrees could cause power levels at the horizon that interfere with medical telemetry operations, especially when atmospheric ducting is considered in the L band. While such an occurrence is likely to happen only a very small percentage of the time, this small possibility for harmful interference may not be acceptable to medical telemetry. AHA and the NVNG MSS industry would need to perform further testing with actual medical telemetry equipment to determine if sharing the 1390-1393 MHz spectrum band between NVNG MSS and medical telemetry service would be possible. This would be difficult to do, however, because there is currently no medical telemetry equipment operating in this band, and testing would require the development of experimental equipment. Further, none of the NVNG MSS licensees have yet constructed gateways which operate in these bands and such testing with actual

gateways must wait until they are constructed.<sup>56</sup> This would involve significant delays. Given the many other options identified herein, such delays are yet another reason that this band should not be chosen.

Although it may prove to be technically feasible to share NVNG MSS feeder uplink spectrum with medical telemetry services without unduly compromising the operations of either service, Final Analysis opposes this option because it is unnecessary. As Final Analysis explained above, the needs of both services can be fully satisfied if the Commission allocates the 608-614 MHz spectrum band to WMTS on a co-primary basis with radio astronomy, and the 1385-1390 MHz and 1432-1435 MHz, or the 1394-1400 MHz and 1427-1429 MHz, spectrum bands to WMTS on a primary basis.

If the Commission nevertheless chooses to allocate the 1391-1400 MHz spectrum band to WMTS, it must ensure that medical telemetry equipment is capable of accepting interference from NVNG MSS systems. NVNG MSS licensees should not be required to modify their systems in order to accommodate yet another new service such as WMTS beyond consideration of hospital proximity in the location of gateway earth stations in order to provide geographic separation.<sup>57</sup>

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<sup>56</sup> Two of the five licensees, Orbcomm and Final Analysis, have constructed gateways operating on their licensed bands. E-Sat, Leo One, and VITA have not yet constructed UHF/VHF gateway stations in the United States and so their eventual site locations are not yet known.

<sup>57</sup> NVNG MSS gateway locations already are being constrained by the need to avoid harmful out-of-band interference from government radars operating in the 1385-1390 MHz band and the concomitant necessity of avoiding geographic proximity to these radar sites. The additional complexity of having to consider geographic proximity to hospital sites is yet another complication in considering this band.

**F. FCC Option 1 Is Not Feasible Because It Results In Inadequate Spectrum for NVNG MSS Feeder Downlinks.**

In the NPRM, the Commission proposes the allocation of the 1395-1400 MHz and the 1429-1432 MHz to WMTS as "Option 1."<sup>58</sup> Final Analysis strongly opposes this option because it would overlap with the NVNG MSS downlink feeder band in the 1429-1432 MHz band.

**1. Downlink Operations Are Very Likely to Cause Harmful Interference to Medical Telemetry.**

Our preliminary conclusion is that it is not possible to protect medical telemetry from interference if the spectrum is shared. There has not been sufficient time to conduct the rigorous technical analysis and hardware testing which would be required to demonstrate the feasibility of sharing, and critical information needed for such an analysis has yet to be provided by the Medical Telemetry Industry. Without additional definitive information about the characteristics of medical telemetry systems, their operating environment, and operational criteria, there is no way to determine whether sharing is possible. However, given the information that has been provided, including the typical location of MT collector antennas near windows (thus eliminating possible protective effects from building attenuation) and the current utilization of Medical Telemetry equipment to monitor ambulatory patients outside of the building, power levels contemplated in this band will almost certainly cause interference in those two, apparently typical situations. While it is possible that receiver antennas inside large, well-shielded buildings could operate without interference, operations and equipment installations are not limited to these special cases, we are told by industry representatives. Therefore, an allocation of this band

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<sup>58</sup>

See NPRM at ¶ 22.

to WMTS in this proceeding is likely to remove any possibility for NVNG MSS use of these bands because of the likelihood of frequent, harmful interference.

**2. The 1427-1432 MHz Band Is The One Most Critical To The Industry.**

As explained above, NVNG MSS has a critical need for this downlink feeder spectrum. While the industry has inadequate feeder uplink spectrum that is not well suited to feederlink operations, the situation is far worse in the downlink band where no second round licensee has any dedicated feeder downlink spectrum. This band is close to gaining global allocation. If the U.S. adopts a position which eliminates use of this band for NVNG MSS, not only will this allocation be lost, it will be many years before another candidate band can be located, studied, and allocated. The blow to the industry's ability to effectively implement their licenses systems would be devastating, and it must be avoided.

**3. 1427-1432 MHz Should Not Be To Allocated To WMTS For These Reasons.**

In any event, this option is unnecessary because, as Final Analysis explained above, the needs of both services can be fully satisfied if the Commission allocates the 608-614 MHz spectrum band to medical telemetry services on a co-primary basis with radio astronomy, and additional frequencies from the 1385-1390 MHz and 1432-1435 MHz, or 1394-1400 MHz and 1427-1429 MHz, spectrum bands as necessary.

If the Commission nevertheless chooses to allocate the 1429-1432 MHz spectrum band for WMTS, it must ensure that medical telemetry equipment can accept interference from NVNG MSS systems. Accordingly, the Commission must require medical telemetry equipment to accept any modifications necessary, including operating power levels and confining operations to in-building use, to ensure that it can accept interference from NVNG MSS systems. As is the

case with Option 2, NVNG MSS should not be required to modify their systems in order to accommodate WMTS operations in downlink bands.

**V. THE COMMISSION SHOULD AMEND THE PROPOSED SERVICE RULES TO MORE CLEARLY DELINEATE THE BOUNDARIES FOR WMTS**

**A. The Definition for “Medical Telemetry” Should Explicitly Exclude Voice and Video Transmissions.**

In the NPRM, the Commission requests comment on its proposal to adopt the following definition for “medical telemetry”:

Wireless medical telemetry is defined as the measurement and recording of physiological parameters and other patient-related information via radiated bi- or unidirectional electromagnetic signals in the *[608-614 MHz, 1395-1400 MHz, and 1429-1432 MHz]* or *[608-614 MHz and 1391-1400 MHz]* frequency bands.<sup>59</sup>

Final Analysis submits that the definition for medical telemetry should explicitly exclude voice and video transmissions. Moreover, the definition should specify the 608-614 MHz, 1385-1390 MHz and 1432-1435 MHz frequency bands, which would not harm the efforts of the United States and the NVNG MSS industry to secure a global allocation of the 1390-1393 MHz and 1429-1432 MHz frequency bands for NVNG MSS feeder links. Accordingly, Final Analysis proposes the following definition for medical telemetry:

Wireless medical telemetry is defined as the measurement and recording of physiological parameters and other patient-related information, *excluding voice and video*, via radiated bi- or unidirectional electromagnetic signals in the *[608-614 MHz], [608-614 MHz and 1385-1390 MHz]* or *[608-614 MHz, 1385-1390 MHz and 1429-1432 MHz]* frequency bands.

This definition would more clearly identify the limits on medical telemetry that the Commission intends to establish, and thus would better serve the public interest.

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<sup>59</sup> *Id.* at ¶¶ 24-26, Appendix A at 12.

**B. The Definition for "Health Care Facility" Should Be Limited to Facilities Accredited Under State or Federal Law.**

The Commission also requests comment on its proposal to adopt the following definition for "health care facility":

A health care facility includes hospitals and other establishments that offer services, facilities and beds for use beyond a 24 hour period in rendering medical treatment, and institutions and organizations regularly engaged in providing medical services through clinics, public health facilities, and similar establishments, including government entities and agencies for their own medical activities; except the term health care facility does not include an ambulance or other moving vehicle.<sup>60</sup>

The Commission asks whether this definition should be expanded to cover in-home medical uses. Final Analysis believes that medical telemetry devices should not be authorized for "in-home medical uses" under any circumstances.<sup>61</sup> Additionally, Final Analysis is concerned that qualifying government entities and agencies be limited to actual health care facilities. Moreover, Final Analysis submits that the definition for medical telemetry should be limited to facilities accredited under state or federal law. Accordingly, Final Analysis proposes the following definition for "health care facility":

A health care facility includes hospitals and other establishments ***accredited under state or federal law*** that offer services, facilities

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<sup>60</sup> *Id.* at ¶ 26, Appendix A at 11-12.

<sup>61</sup> Remote medical telemetry is intended to address the need for constant monitoring of multiple patients by medical staff in a centralized health care facility. It is difficult to conceive of any legitimate practical use in a home setting. A patient being monitored by a private duty nurse in the home does not need remote monitoring equipment -- the nurse/patient ratio is one to one. A patient in the home being cared for by family members similarly does not need remote monitoring via such devices, which would require each home to have a dedicated receiving station and where family care-givers would not be professionally trained in how to interpret medical telemetry displays or results. The only other possible use would be remote monitoring of a patient in the home by medical staff in a separate facility some distance away. This is not a low-powered, short distance medical telemetry application.

and beds for use beyond a 24 hour period in rendering medical treatment, and institutions and organizations *accredited under state or federal law that are* regularly engaged in providing medical services through clinics, public health facilities, and similar establishments *accredited under state or federal law*, including *health care facilities used by* government entities and agencies for their own medical activities; except the term health care facility does not include an ambulance or other moving vehicle.

This definition would more clearly identify the limits on medical telemetry that the Commission has proposed to establish, and thus would better serve the public interest.

**C. The Commission Could License WMTS Equipment By Rule Unless the 1391-1400 MHz Spectrum Band Is Allocated for WMTS.**

In the NPRM, the Commission proposes to license WMTS by rule as one of the Citizen's Band services contained in Part 95 of the rules.<sup>62</sup> If the Commission does not allocate the 1391-1400 MHz spectrum band for WMTS, then Final Analysis does not oppose this proposal. However, if the Commission allocates the 1391-1400 MHz spectrum band for WMTS, then individual operator's licenses must be required for medical telemetry equipment. NVNG MSS systems have a crucial need for the 1390-1393 MHz spectrum band for feeder uplinks which overlaps the 1391-1400 MHz spectrum band by 2 MHz (*i.e.*, 1391-1393 MHz). If the Commission chooses to allocate this spectrum to both NVNG MSS and WMTS, then the two services would have to coordinate use of the 1391-1393 MHz overlap band to prevent harmful interference. As the Commission notes in the NPRM, individual licensing is designed to provide licensees with protected service areas, which would be necessary if both NVNG MSS and WMTS are using the overlapping spectrum. Final Analysis submits that this is yet another reason why the Commission should not allocate the 1391-1400 MHz spectrum band for WMTS.

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<sup>62</sup> See NPRM at ¶ 27.

**D. The Commission Should, for the Sake of Clarity, Explicitly State In the Rules That Authorized Health Care Providers May Only Utilize WMTS Equipment Within Health Care Facilities.**

In the NPRM, the Commission proposes a three-part definition for “authorized health care providers.”<sup>63</sup> Final Analysis is concerned that the proposed definition could be misinterpreted as allowing “a physician or other individual authorized under state or federal law to provide health care services” or “a trained technician under the supervision and control of an individual or health care facility authorized under state or federal law to provide health care services” to operate medical telemetry equipment at locations outside of authorized health care facilities (*e.g.*, in a patient’s home).

In order to avoid misinterpretations, Final Analysis suggests the following definition of “authorized health care provider”:

(1) any physician or other individual authorized under state or federal law to provide health care services; (2) any individual authorized under state or federal law to provide health care service who is operating or employed by a health care facility; or (3) any trained technician under the supervision and control of an individual or health care facility authorized under state or federal law to provide health care services. An authorized health care provider may only operate a wireless medical telemetry transmitter within a health care facility.

This clarification would better serve the public interest by more clearly identifying the individuals who can operate medical telemetry devices within authorized health care facilities.

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<sup>63</sup> *Id.* at ¶ 28.



**E. The Commission Should Appoint a Single Frequency Coordinator Who Maintains a Database of the Operating Parameters of WMTS Users.**

Final Analysis supports the Commission's proposal to appoint a single, independent frequency coordinator for a renewable 5-year term.<sup>64</sup> The coordinator should oversee the creation of a single database of the parameters identified in the NPRM using a geographically based system. Data base information should be made available on an open web site for access by the general public. The Commission should also require operators of medical telemetry services to provide the coordinator with lists of utilized frequencies by geographic location, which would be available to the general public on a web site. The frequency coordinator should also make annual summaries of registered equipment available to the general public.

**F. The Commission Should Limit The Primary Allocation for Medical Telemetry Services to Data Transmission on a Unidirectional Basis.**

Final Analysis supports the Commission's proposal to exclude voice and video transmissions from permissible communications under WMTS.<sup>65</sup> Final Analysis agrees that WMTS should be limited to the transmission of data relating to physiological parameters and other patient-related information, as well as polling for this data.

Final Analysis believes that bi-directional operations should be secondary. However, in the event that bi-directional activities can be justified, Final Analysis has identified bands that could be utilized without overlapping NVNG MSS. In any event, bi-directional operations are not a priority and they should be permitted only to the extent that suitable frequencies are available and other services, including NVNG MSS, will not be adversely affected. In any

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<sup>64</sup> See *id.* at ¶¶ 29-32.

<sup>65</sup> See *id.* at ¶ 33.

event, AHA has not demonstrated on the record that bi-directional data operations justify additional spectrum allocations, and the NPRM lacks specificity with respect to WMTS operational parameters, which hampers Final Analysis's ability to respond fully to this issue. As the Commission recognizes, WMTS should be used as a means for transmitting vital patient data, not as a wireless intercom system.

**G. Technical Standards Are Necessary To Encourage Spectral Efficiency and To Protect Services Operating in Adjacent Bands from Out-Of-Band Emissions.**

The Commission seeks comment in the NPRM on the AHA's recommendation that there should be only minimal technical standards for WMTS equipment.<sup>66</sup> Final Analysis strongly believes that the Commission should require WMTS to meet spectral efficiency design standards. Such standards are the only way to protect against excessive and wasteful allocations to this service. Additionally, Final Analysis recommends that the Commission adopt sufficient technical standards for WMTS to protect adjacent band services against out-of-band emissions from WMTS equipment.

The Commission also seeks comment on its channelization proposal.<sup>67</sup> Final Analysis cannot comment on the Commission's channelization proposal, however, because the NPRM lacks sufficient information about the operational scheme of WMTS. However, Final Analysis strongly disagrees with AHA's assertion that spread-spectrum is a spectrally inefficient technique by which one user could monopolize the entire band.<sup>68</sup> Final Analysis believes that it is generally accepted that spread-spectrum multiple access ("SSMA") techniques can be even more efficient for multiple use than frequency division multiple access ("FDMA") techniques.

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<sup>66</sup> See *id.* at ¶ 34.

<sup>67</sup> See *id.* at ¶ 35.

<sup>68</sup> See *id.*

Indeed, the ITU has identified spread spectrum as a sharing technique that can allow both multiple users, and more than one radio service, to share spectrum.<sup>69</sup> SSMA techniques can be used to create even more spectrally efficient equipment, and accordingly, WMTS should be required to thoroughly investigate the possibility of using them.

With respect to field strength limits for WMTS transmitters, higher field strength could allow WMTS systems to be more robust, and thus able to accept more interference from other co-channel systems. This would be particularly important if the Commission requires NVNG MSS and WMTS to overlap, because an additional 5 dB in field strength could allow WMTS to accept higher interference from NVNG MSS without causing harmful interference to out-of-band services. Therefore, Final Analysis has no objection to higher field strength limits in the 1395-1400 MHz and 1429-1432 MHz or 1391-1400 MHz spectrum bands to offset increased propagation losses at these frequencies,<sup>70</sup> particularly if it allows WMTS systems to be more resistant to interference from other systems and still meet out-of-band emission requirements for the protection of radio astronomy operating in 1400-1427.

#### **H. The Spectrum Coordinator Can Facilitate Spectrum Use By Implementing Distance Limits To Avoid Frequency Conflicts And Protect Existing Services.**

The Commission asks commenters who suggest alternatives to the frequency bands proposed in the NPRM to address the need to protect other existing services.<sup>71</sup> Final Analysis submits that WMTS can coordinate its spectrum use between two bands if necessary to avoid operations in nearby channels when in the vicinity of radio-astronomy sites. This "coordination"

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<sup>69</sup> See Rec. ITU-R SM.1132, "General Principles and Methods for Sharing Between Radio Services" 1995.

<sup>70</sup> See *id.* at ¶ 36.

<sup>71</sup> See *id.* at ¶ 38.

can take the form of distance limits on WMTS for two different bands to avoid such conflicts. In this manner, the frequency coordinator could proactively avoid interference to out-of-band services by carefully managing distances limits between services that could experience harmful interference. Final Analysis also supports placing Part 15 type warnings on medical telemetry equipment.<sup>72</sup> Operators of WMTS equipment should contact the spectrum coordinator before placing equipment into operation at a new site.

**I. The Commission Should Require That WMTS Transmitters Be Authorized Through the Declaration of Conformity Procedure.**

Final Analysis agrees with the Commission's proposal to require that WMTS transmitters be authorized through the Declaration of Conformity procedure in Part 2 of the Commission's Rules.<sup>73</sup> Final Analysis also agrees with AHA that each WMTS equipment manufacturer should be required to place the technical information for its systems on the public record.<sup>74</sup>

**J. WMTS Equipment Must Be Adequately Tested Before Being Placed Into Operation.**

Final Analysis takes no position with respect to whether the transition period should be two or four years.<sup>75</sup> However, Final Analysis submits that the most important issue here is that all WMTS equipment be adequately tested before being placed into operation.

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<sup>72</sup> See *id.*

<sup>73</sup> See *id.* at ¶ 39.

<sup>74</sup> See *id.*

<sup>75</sup> See *id.* at ¶¶ 40-41.

## VI. CONCLUSION

For the foregoing reasons and in accordance with the comments herein above, the Commission should allocate 6 MHz of spectrum in the 608-614 MHz band and adopt new service rules for Wireless Medical Telemetry Service ("WMTS"). The Commission should allocate additional spectrum for WMTS only in the event, and to the extent that, the need for additional spectrum is actually justified. In any event, Final Analysis has identified multiple alternative options that address all of the expressed concerns and needs of medical telemetry without overlapping NVNG MSS systems. Therefore, Commission should allocate only those frequencies that avoid any overlap or harmful interference to potential uses for feeder links of frequencies in the 1390-1393 MHz and 1429-1432 MHz bands by Non-Voice Non-Geostationary Mobile Satellite Service.

Respectfully submitted,

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September 16, 1999

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